

PATENT SPECIFICATION

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 (54) A PORTABLE GUN PROVIDED WITH AN ANCILLIARY AIMING GUN



(71) We, RHEINMETALL GESELLSCHAFT MIT BESCHRÄNKTER HAF-
 TUNG, of Ulmenstrasse 125, 4 Dusseldorf,
 German Federal Republic, a Company
 5 organised and existing under the laws of the
 German Federal Republic, do hereby
 declare the invention, for which we pray
 that a Patent may be granted to us, and the
 method by which it is to be performed, to be
 10 particularly described in and by the follow-
 ing statement:-

The present invention relates to a port-
 able gun provided with an ancillary aiming
 gun. An example of a portable gun is a
 15 shoulder-fired anti-tank weapon.

Hitherto known larger calibre portable
 weapons of the recoilless type have been
 aimed by means of a simple aiming device
 which, for example, may comprise a sighting
 20 device with notch-and-bead or an optical
 viewfinder. Such sighting devices may be
 well suited for hand-operated weapons
 which fire several shots one after the other
 and which with some practice also make it
 25 possible to hit the target with the first shot.
 However, the same does not apply to the
 afore-mentioned larger calibre portable
 weapons as these work with quite a low
 muzzle velocity and thus the projectile takes
 30 a very steeply inclined flight path and mov-
 ing targets present great problems for aim-
 ing.

For larger calibre type recoilless weapons
 mounted on a gun carriage it is already
 35 known to use an ancillary apparatus for aim-
 ing which operates by firing a machine gun,
 but the weapon used here is an automatic
 weapon in the form of a gas pressure loader
 with 12.7 mm calibre and a box type
 40 magazine for 10 or 20 shots.

The total weight of this machine gun
 ready for use with a 10 shot magazine is
 approximately 12.5 Kg, which for a portable
 weapon is, of course, too heavy. The reason
 45 for this on the one hand is the fact that this
 machine gun has a large calibre and on the
 other hand that it is an automatic, firmly
 mounted gun, which naturally on account of
 its complicated breech and loading mechan-
 50 ism has a considerable weight.

It is a principal object of the present
 invention to provide a portable gun pro-
 vided with an ancillary aiming gun which is
 simple in construction, (for example, prefer-
 55 red embodiments have no movable mechan-
 ical parts, and particularly no breech
 mechanism) and which nevertheless can be
 arranged according to preferred embodi-
 ments of the invention to permit several
 60 shots to be fired in quick succession before
 the larger calibre projectile is fired from the
 main weapon. The ancillary aiming gun will
 weigh only a fraction of the main weapon so
 that the combination is designed to be port-
 able.

In accordance with the invention there is
 provided a portable gun provided with an
 ancillary aiming gun of smaller calibre, the
 aiming gun comprising at least one barrel
 70 mounted on the barrel of the main weapon,
 the barrel of the aiming gun having arranged
 therein at least one projectile and a propel-
 lant charge therefor, means being provided
 operable by the person carrying the portable
 gun to detonate said propellant charge. The
 75 ancillary gun is preferably a "front loader"
 and has at least one complete projectile with
 propellant charge which for the purpose of
 finding the target can be fired by the
 operator. Optionally according to an
 80 embodiment of the invention several barrels
 each containing a projectile can be arranged
 parallel to each other on the main gun bar-
 rel, or according to another embodiment in
 a single barrel several projectiles with prop-
 85 ellant charges are arranged one behind the
 other and are triggered off in succession by a
 firing mechanism, whereby the projectile
 nearest to the mouth of the barrel is fired
 first.

Since the wall of the ancillary gun barrel
 can be made very thin and is preferably
 closed off at its rear end making unneces-
 sary the use of a complicated automatic
 breech mechanism, it is possible to construct
 95 the ancillary gun by a simple process which
 only marginally increases the weight and
 production costs, while at the same time
 achieving a much improved aim. It should
 further be noted that the projectile of the

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ancillary apparatus is fired with a relatively low muzzle velocity in order to achieve the same ballistic ratios as with the projectile of the main weapon. This also results in relatively less recoil during firing so that the recoil has no effect, or only very little effect, on the aiming of the main weapon.

Preferred embodiments of the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a schematic side elevation of a large calibre shoulder weapon fitted with an ancillary aiming gun according to the invention,

Figure 2 is a longitudinal section through the barrel of an ancillary aiming gun with several successively arranged projectiles and propellant charges therein,

Figure 3 is a schematic representation of another arrangement of the projectiles in the barrel of an ancillary aiming gun,

Figure 4 illustrates a means of securing a projectile in the barrel of an ancillary aiming gun,

Figure 5 illustrates a securing means alternative to that of Figure 4,

Figure 6 is a cross section through the barrel of a large calibre shoulder weapon with several target locating ancillary gun barrels arranged around it parallel to each other,

Figure 7 schematically represents in section a rear end portion of the barrel of an ancillary aiming gun, and

Figure 8 is a circuit diagram of an electric ignition chain for firing an ancillary aiming gun of a portable weapon according to the invention.

The shoulder weapon 2 of Figure 1 is a portable anti-tank weapon of 75 to 120mm calibre. A projectile (not shown) is arranged in the barrel 4 which has a nozzle 5 at its rear end for the discharge of gases produced during firing and which produce a thrust in the opposite direction to the recoil. On the barrel 4 there is mounted, in accordance with the present invention, an ancillary aiming gun 6. The ancillary aiming gun 6 in the example according to Figure 1 comprises a small-calibre gun barrel 8 which is secured to the main gun barrel 4 by means of a mounting 10.

Beneath the gun barrel 4 there is attached a shoulder support 12 having a carrying handle 14 and a hand grip 16. A trigger mechanism 18, for example, has a trigger 20 for the ancillary apparatus 6 and a trigger 22 for the main weapon. An aiming device 24 comprising of notch-and-bead is arranged on the side of the gun barrel 4 in such a way that the operator can aim the weapon at the target. During this operation one hand of the operator grips the handle 16 and the other hand grips the hand grip 26.

By means of the aiming device 24 the

operator first of all aims the weapon at the target and then fires a shot by means of the ancillary apparatus. The projectiles of the ancillary apparatus are of the tracer type and may produce smoke which can be seen on impact. The operator can thus see how he scored with the shot fired by the ancillary apparatus and he can then readjust his aim so as to be in a position to fire the projectile of the main weapon with a higher degree of accuracy.

When only a small-calibre barrel 8 is used, several projectiles 28 with their propellant charges 30 are arranged one behind the other in the barrel 8—as shown in Figure 2. Each propellant charge 30 is provided with an electric ignition element 36 and by operating the triggering mechanism 18 is supplied with an ignition voltage produced by an ignition voltage generator 38. To prevent all propellant charges 30 from igniting simultaneously, electric blocking means 40 are provided in front of each electric ignition element in such a way that the ignition voltage of the ignition voltage generator 38 first reaches the propellant charge 30 of the projectile 28 nearest the barrel opening 32.

Depending on the design of the trigger mechanism 18, the firing of projectiles 28 from the ancillary gun barrel 8 can be automatic with a timed delay between shots, or the arrangement may be such that the operator has to squeeze the trigger 20 of the ancillary gun each time a projectile 28 is to be fired.

In the example shown there are depicted two triggers 20 and 22 for the ancillary gun 6 and for the main weapon 2, respectively. Alternatively the arrangement may be such that the main weapon is fired by the same trigger as the ancillary gun, for example the main weapon may be automatically fired after the last shot has been fired from the ancillary gun. A further possibility which permits the main weapon to be fired before all the projectiles have been fired from the ancillary gun 6 consists in providing the trigger with a critical pressure point such that as the trigger is squeezed up to this pressure point, projectiles are fired from the ancillary gun 6 and the main weapon 2 is fired only when the trigger is squeezed beyond this pressure point.

Figure 2 shows projectiles 28 arranged one behind another in the barrel 8 which is closed at its rear end by a closure 34. A propellant charge 30 is located behind each projectile 28 and an electrical ignition element 36 extends through the barrel 8 into each charge 30, being controlled by a respective time delay mechanism 40 which ensures that when a voltage generator 38 is actuated by the trigger 20 the charges 30 are detonated in a timed sequence starting with the one nearest the open end of the barrel 8.

In Figure 3 there is shown an alternative example of how projectiles 28' can be supported one behind another in the barrel of the ancillary gun 6. Each projectile 28' is hollow and in the cavity 28'a thereof there is arranged a propellant charge 30' as well as an electric ignition element 36. The rear edge of each leading projectile 28' is then supported against a circumferential ledge 10 28'b of the projectile behind it. The last projectile 28' in the barrel 8 is supported against a closure 34.

In order to achieve a sufficiently good damping for the propellant charges and to prevent the projectiles from sliding out of the barrel 8, the projectiles may be adhesively secured in the barrel or each projectile 28" as shown in Figure 4 may be provided with a circumferential bead 48, while the thin-walled steel barrel 42 of the ancillary gun has at this point a groove 46 which receives the circumferential bead 48 of the projectile 28" as a press fit.

Alternatively, according to Figure 5, a projectile 28'" may be provided with a circumferential groove 50 which receives an inwardly directed bead 52 of the ancillary gun barrel as a press fit.

In the embodiment of the invention illustrated in Figure 6 the barrel 4 of the main weapon 2 is surrounded by a casing 44 of glass-fibre reinforced plastics material in which several smaller calibre barrels 42 in the form of thin-walled steel pipes, are embedded parallel with one another around the main barrel 4. This glass-fibre reinforcement 44 at the same time reinforces the barrel 4 and the steel pipes 42, which form individual ancillary aiming guns for the main gun 4.

In Figure 7 there is shown how the thin-walled steel pipes 42 of Figure 6 are sealed at their rear ends by means of the closures 34. Each closure 34 has a thicker rear part 45 35 which serves to reduce the pressure exerted onto the plastics casing 44 during the firing of the projectile 28. As can be seen, the propellant charge 30 is provided with an electric ignition element 36 one pole 50 of which is connected to the metal closure 34 while the other pole is passed through an insulator outlet 54 and forms an electric cable passage 56 which leads to the firing mechanism, such as the trigger 20 of Figure 55 1.

The firing mechanism shown in Figure 8 has an ignition voltage generator 38 actuated by a trigger such as 20. The ignition voltage produced by the ignition voltage generator 38 is fed to an electric blocking means 40 via delay circuit 58 which is so controlled that the individual shots are fired at timed intervals.

The firing of the ancillary gun can alternatively be effected mechanically, i.e. ignition

may be pyrotechnically produced.

Since the ancillary aiming gun 6 is a small calibre weapon which only has a small muzzle velocity, the gas pressures in the barrel 8 or 42 are relatively small, so that these barrels 8, 42, can be pipes of thin-walled steel, particularly when the aforementioned plastics cladding 44 is used. The pipes 8, 42, may for example be made by pressing and have a forged internal profile, in which for the sake of simplicity of construction the cross section is the same over the whole length.

WHAT WE CLAIM IS:-

1. A portable gun provided with an ancillary aiming gun of smaller calibre, the aiming gun comprising at least one barrel mounted on the barrel of the main weapon, the barrel of the aiming gun having arranged therein at least one projectile and a propellant charge therefor, means being provided operable by the person carrying the portable gun to detonate said propellant charge.

2. A portable gun according to claim 1, wherein the aiming gun comprises a plurality of parallel small calibre barrels mounted on the barrel of the main weapon and wherein means is provided whereby the person carrying the portable gun may fire projectiles successively from said small calibre barrels.

3. A portable gun according to claim 1, wherein the aiming gun comprises a single small calibre barrel mounted on the barrel of the main weapon and the small calibre barrel has arranged therein one behind another a plurality of projectiles with respective propellant charges, there being further provided a firing mechanism operable by the person carrying the portable gun which is adapted to fire the projectiles from the small calibre barrel successively, starting with the projectile nearest to the mouth of the small calibre barrel.

4. A portable gun according to claim 2 or claim 3, wherein the ballistic characteristics of the aiming gun are similar to those of the main weapon, the barrel of the main weapon and the barrel of the aiming gun being parallel to each other.

5. A portable gun according to claim 2 or claim 4 as appendant to claim 2, wherein the small calibre barrels are arranged parallel with one another around and parallel with the barrel of the main weapon.

6. A portable gun according to claim 5, wherein the small calibre barrels are of thin-walled steel and are embedded in a casing of a synthetic plastics material which surrounds the barrel of the main weapon.

7. A portable gun according to claim 6, wherein the casing of synthetic plastics material is fibre-reinforced.

8. A portable gun according to claim 6 or claim 7, wherein the small calibre barrels

are extruded.

9. A portable gun according to claim 8, wherein the small calibre steel barrels have forged rifling internal profiles.

5 10. A portable gun according to any one of claims 1 to 9, wherein the or each small calibre barrel has the same diameter throughout its length.

10 11. A portable gun according to any one of the preceding claims, wherein the or each barrel of the aiming gun is closed at the rear end by means of a closure of plastics material which has a portion of greater diameter than the interior of the associated barrel.

15 12. A portable gun according to any one of the preceding claims, wherein the or each projectile of the aiming gun is adhesively secured in its position in the associated barrel.

20 13. A portable gun according to any one of claims 1 to 11, wherein a projectile is secured in its position in the associated barrel of the aiming gun by means of a circumferential groove in said barrel receiving
25 a circumferential bead on the projectile.

14. A portable gun according to claim 13, wherein the circumferential groove is formed by an outwardly convex crease in the wall of said barrel.

30 15. A portable gun according to any one of claims 1 to 11, wherein each projectile of the aiming gun is secured in its position in

the associated barrel by means of a circumferential groove in the projectile which receives a deformation of the wall of said 35 barrel.

16. A portable gun according to any one of the preceding claims, wherein the means for detonating the propellant charge of the aiming gun is in the form of an electric firing 40 device which actuates each of a plurality of electric ignition elements associated with respective propellant charges, whereby *via* a trigger an electric ignition voltage generator may be activated which *via* a delay circuit 45 will successively actuate the ignition elements for the projectiles of the ancillary gun and subsequently fire the main weapon.

17. A portable gun according to claim 16, wherein the delay times of the delay circuit are adjustable. 50

18. A portable gun substantially as herein described and as shown in Figures 1 and 2 and 8, Figure 3, Figure 4, Figure 5 or 55 Figures 6 and 7 of the accompanying drawings.

KINGS PATENT AGENCY LIMITED

By

J. B. KING

Director

Registered Patent Agent
146a, Queen Victoria Street,
London EC4V 5AT
Agents for the Applicants

